ANEXO

###Introducción de datos y creación del grafo.

```
> atr <- read.csv("G:/traits.csv", head=FALSE)
> rel <- read.csv("G:/relations.csv", head=FALSE)
> library(igraph)
> g <- graph.empty()
> g <- graph.data.frame(rel, directed=FALSE, vertices=atr)
```

###Código para la descripción de red del apartado 5.2.

###Numero de conversaciones por persona, media y moda.

```
> degree(g)
```

Adrián	Alejandro	Ana Pilar	Carmen	Cesar	Clara	David
4	1	10	7	3	8	7
Eduardo	**Elena**	**Fernanda**	**Fernando**	**Guillermo**	**Iván**	**Javier**
1	4	4	4	2	5	4
Lucia	**Luis**	**María**	**Marta**	**Miguel**	**Natanel**	**Nicolas**
4	8	8	8	1	1	6
Ricardo	**Roberto**	**Sara**	**Sofia**	**Teresa**		
12	6	6	12	8		

```
> mean(degree(g))
[1] 5.538462

> table(degree(g))
 1  2  3  4  5  6  7  8 10 12
 4  1  1  6  1  3  2  5  1  2
```

###Clasificación por género, antigua clase, nacionalidad y género por antigua clase.

```
> table(V(g)$V2)
 F  M
11 15

> table(V(g)$V3)
 A  B  C  D
11 10  2  3

> table(V(g)$V4)
   español extranjero
```

```
        22          4
```

```
> table(atributos$sexo, atributos$clase)
    A  B  C  D
  F 6  3  1  1
  M 5  7  1  2
```

###Introducimos el código para cada una de las figuras y tablas.

Figura 1.

```
> V(g)$color  <- "lightblue"
> V(g)[V2=="F"]$color  <- "pink"
> plot.igraph(g, layout=layout.fruchterman.reingold,
edge.curved=FALSE, vertex.color=V(g)$color, edge.width=peso,
edge.arrow.size=0.2,edge.arrow.width=3)
```

Figura 2.

```
> plot.igraph(g, layout=layout.fruchterman.reingold,
edge.curved=FALSE, vertex.color=V(g)$color, edge.width= E(g)$V3,
edge.arrow.size=0.2, edge.arrow.width=3)
```

Figura 3.

```
> E(g)$color  <- "grey"
> E(g)[V4=="N"]$color  <- "orange"
> plot.igraph(g, layout=layout.fruchterman.reingold,
edge.curved=FALSE, vertex.color=V(g)$color,
edge.color=E(g)$color ,edge.arrow.size=0.2, edge.arrow.width=3)
```

Figura 4.

```
> E(g)$color  <- "white"
> E(g)[V4=="N"]$color  <- "orange"
> plot.igraph(g, layout=layout.fruchterman.reingold,
edge.curved=FALSE, vertex.color=V(g)$color,
edge.color=E(g)$color ,edge.arrow.size=0.2, edge.arrow.width=3)
```

Figura 5.

```
> V(g)[V3=="A"]$color <- 'purple'
> V(g)[V3=="B"]$color <- 'green'
> V(g)[V3=="C"]$color <- 'grey'
> V(g)[V3=="D"]$color <- 'brown'
> E(g)$color  <- "grey"
> E(g)[V4=="N"]$color  <- "orange"
```

```
> plot.igraph(g, layout=layout.fruchterman.reingold,
edge.curved=FALSE, vertex.color=V(g)$color, edge.width =
E(g)$V3,edge.color=E(g)$color ,edge.arrow.size=0.2,
edge.arrow.width=3)
```

Figura 6.

```
> V(g)[V3=="A"]$color <- 'purple'
> V(g)[V3=="B"]$color <- 'green'
> V(g)[V3=="C"]$color <- 'grey'
> V(g)[V3=="D"]$color <- 'brown'
> E(g)$color  <- "black"
> E(g)[V4=="N"]$color  <- "white"
> plot.igraph(g, layout=layout.fruchterman.reingold,
edge.curved=FALSE, vertex.color=V(g)$color,
edge.color=E(g)$color ,edge.arrow.size=0.2, edge.arrow.width=3)
```

Figura 7.

```
> V(g)$color <- 'purple'
> V(g)[V4=="español"]$color <- 'yellow'
> E(g)$color  <- "grey"
> E(g)[23]$color=E(g)[24]$color=E(g)[23]$color=E(g)[27]$color=
E(g)[28]$color=E(g)[29]$color=E(g)[30]$color=E(g)[31]$color=E(g)
[51]$color=E(g)[52]$color=E(g)[53]$color=E(g)[54]$color=E(g)[55]
$color=E(g)[56]$color=E(g)[68]$color=E(g)[69]$color=E(g)[70]$col
or=E(g)[71]$color=E(g)[72]$color=E(g)[5]$color=E(g)[14]$color=E(
g)[19]$color=E(g)[34]$color=E(g)[35]$color=E(g)[37]$color=E(g)[3
9]$color=E(g)[47]$color=E(g)[57]$color=E(g)[67]$color <- "red"
> plot.igraph(g, layout=layout.fruchterman.reingold,
edge.curved=FALSE, vertex.color=V(g)$color,
edge.color=E(g)$color ,edge.arrow.size=0.2, edge.arrow.width=3)
```

###Código para los comentarios del apartado 5.3.1

```
> shortest.paths(g, mode='in')
> shortest.paths(g, mode='out')
> peso<-(13-E(g)$V3)/12       ###Influencia del número de conversaciones.
> shortest.paths(g, mode='in', weights=peso)
> shortest.paths(g, mode='out', weights=peso)
> diameter(g, directed = FALSE, unconnected = TRUE)
[1] 5
> average.path.length(g, directed=TRUE, unconnected=TRUE)
[1] 2.635294
```

Figura 8.

```
> pa<- get.diameter(g, directed = TRUE, unconnected = TRUE)
> V(g)[pa]$color <- 'green'
> E(g)$color <- 'grey'
> E(g, path=pa)$color <- 'red'
> E(g, path=pa)$width <- 3
> plot(g, layout=layout.fruchterman.reingold,
edge.arrow.size=0.2, edge.arrow.width=3)
> pa
[1]  7 24 25  6 22 19
> farthest.nodes (g, directed = TRUE, unconnected = TRUE)
[1]  7 19  5
```

Figura 9.

```
> peso<-(13-E(g)$V3)/12
> pa<- get.diameter(g, directed = TRUE, unconnected =
TRUE,weight=peso)
> V(g)[pa]$color <- 'green'
> E(g)$color <- 'grey'
> E(g, path=pa)$color <- 'red'
> E(g, path=pa)$width <- 3
> plot(g, layout=layout.fruchterman.reingold,
edge.arrow.size=0.2,edge.arrow.width=3)
> pa
[1] 15 10 18 23 24 11
```

Figura 10.

```
> pa<- get.diameter(g, directed = FALSE, unconnected = TRUE)
> V(g)[pa]$color <- 'green'
> E(g)$color <- 'grey'
> E(g, path=pa)$color <- 'red'
> E(g, path=pa)$width <- 3
> plot(g, layout=layout.fruchterman.reingold)
> pa
[1]  2  1  6 17  3
> farthest.nodes (g, directed = FALSE, unconnected = TRUE)
[1] 2 3 4
```

Tabla 3.

```
> degree(g,mode = "out")
> degree(g,mode = "in" )
> degree(g,mode = "out" )-degree(g,mode = "in" )
```

Tabla 4.

```
> closeness(g, mode = c("out"),weights = peso)
> closeness(g, mode = c("in"),weights = peso)
> closeness(g, mode = c("all"),weights = peso)
```

Tabla 5.

```
> neighborhood.size(g, 2, mode="all")-1
> neighborhood.size(g, 2, mode="out")-1
> neighborhood.size(g, 2, mode="in")-1
> (neighborhood.size(g, 2, mode="all")-1)/25
> (neighborhood.size(g, 2, mode="in")-1)/25
> (neighborhood.size(g, 2, mode="out")-1)/25
```

Tabla 6.

```
> neighborhood.size(g, 3, mode="all")-1
> neighborhood.size(g, 3, mode="out")-1
> neighborhood.size(g, 3, mode="in")-1
> (neighborhood.size(g, 3, mode="all")-1)/25
> (neighborhood.size(g, 3, mode="in")-1)/25
> (neighborhood.size(g, 3, mode="out")-1)/25
```

Tabla 7.

```
> betweenness(g, directed = TRUE)
> betweenness(g, directed = TRUE, weights = peso)
> betweenness(g, directed = FALSE)
> betweenness(g, directed = FALSE, weights = peso)
```

Tabla 8.

```
> evcent (g, directed = TRUE, weights = peso)
> evcent (g, directed = FALSE, weights = peso)
```

Tabla 9.

```
> clique.number(g)
> largest.cliques(g)
```

Tabla 10.

```
> maximal.cliques(g, min=NULL, max=NULL)
```

Figura 11.

```
> e<-edge.betweenness.community (g, weights = peso, directed =
TRUE)
Graph community structure calculated with the edge betweenness
algorithm
Number of communities (best split): 11
Modularity (best split): 0.2671492
Membership vector:
    Adrián Alejandro Ana Pilar    Carmen     Cesar     Clara     David
        1         2         3         3         4         5         4
   Eduardo    Elena  Fernanda  Fernando Guillermo      Iván    Javier
        6         7         3         7         8         9        10
     Lucia     Luis     María     Marta    Miguel   Natanel   Nicolás
        3         3         3         3        11        10         4
   Ricardo  Roberto      Sara     Sofía    Teresa
       10        10         7         3         3
> plot(e,g)
```

Figura 12.

```
> g <- graph.data.frame(rel, directed=FALSE, vertices=atr)
> e<-edge.betweenness.community (g, weights = peso)
> e
Graph community structure calculated with the edge betweenness
algorithm
Number of communities (best split): 4
Modularity (best split): 0.3720576
Membership vector:
    Adrián Alejandro Ana Pilar    Carmen     Cesar     Clara     David
        1         1         2         2         3         3         4
   Eduardo    Elena  Fernanda  Fernando Guillermo      Iván    Javier
        3         4         2         4         2         1         1
     Lucia     Luis     María     Marta    Miguel   Natanel   Nicolás
        2         2         2         2         3         3         3
   Ricardo  Roberto      Sara     Sofía    Teresa
        3         3         4         2         2
> plot(e,g)
```

Figura 13.

```
> walktrap.community(g,weights = peso)
Graph community structure calculated with the walktrap algorithm
Number of communities (best split): 4
Modularity (best split): 0.3732452
Membership vector:
   Adrián  Alejandro  Ana Pilar    Carmen    Cesar  Clara  David   Eduardo
        2          2          3         3        1      1      1         1
    Elena   Fernanda   Fernando Guillermo     Iván Javier  Lucia      Luis
```

```
    4        3         4        1         1        1       3       3
  María    Marta    Miguel  Natanel    Nicolás   Ricardo   Roberto    Sara
    3        3        1        1        1         1         1       4
  Sofia     Teresa
    3         3
> plot(walktrap.community(g,weights = peso),g,edge.curved=FALSE)
```